

SHKLOVSKIY, I. S.
PHASE I

TREASURE ISLAND BIBLIOGRAPHICAL REPORT

AID 382 - I

BOOK

Call No.: AF625991

Author: SHKLOVSKIY, I. S.

Full Title: RADIO ASTRONOMY (POPULAR SKETCH)

Transliterated Title: Radioastronomiya (Populyarnyy ocherk)

Publishing Data

Originating Agency: None

Publishing House: State Publishing House of Technical and
Theoretical Literature

Date: 1953

No. pp.: 216

No. of copies: 10,000

Editorial Staff

Editor: None

Tech. Ed.: None

Editor-in-Chief: None

Appraiser: None

Text Data

Coverage: The book is based on the concept of the new science of radio astronomy from the physical approach. The information given is covered by the table of contents. The text was compared with Bernard Lovell's and J. A. Clegg's Radio Astronomy (1952), and the following new information found in it may be of interest:
1) V. L. Ginsburg and the author in 1946 independently proved that solar radio wave emission originates in the solar atmosphere and not in the photosphere (p. 61), and that the solar atmosphere is entirely

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Radioastronomiya (Populyarnyy ocherk)

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non-permeable to radio waves. This has been confirmed by observations made in 1947 by S. E. Khaykin and B. M. Chikhachev in Brazil during the total solar eclipse. 2) V. G. Fesenkoy computed the thermal conductivity of the surface of the moon to be about 1000 times smaller than that of granite or basalt; only pulverized dust can have such a small thermal conductivity (p. 94). 3) A. A. Kalinyak, V. I. Krasovskiy, V. B. Nikonov obtained two photographs of the region of the Galactic center (pp. 107-109), one on a regular plate and the other with an infra-red filter; the latter shows that the infra-red rays are much less absorbed by the inter-stellar dust than are the visual rays. 4) The astrophysicist S. B. Pikel'ner showed that between inter-stellar gas clouds there exists a rarified medium with a density of 0.1 atom per cubic cm., which spreads far beyond and above the Galactic plane (p. 112). 5) Radio wave emission is scarcely absorbed when passing through enormous clouds of inter-stellar dust, in contrast to visual rays (p. 124). 96 diagrams, graphs and photoplates illustrate the text.

The author calls his text a popular sketch of the young science of radio astronomy and dedicates it to readers without a special education, but often makes rather complicated and advanced statements

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without giving adequate explanation. The book is well written with a sound scientific basis and mentions many results of the work of Soviet scientists.

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SHKLOVSKIY, I. S. Dr. Physico-Math. Sci.

"Radio Radiation of Metagalaxies and the Cosmological Problem," a paper
given at the All-University Scientific Conference "Lomonosov Lectures", Vest. Mosk.
Un., No.8, 1953.

Translation U-7895, 1 Mar 56

STELLAR, A. S.

Stellar Astronomy, Galactic Structure (3671)

Izv. Kazansk. Astron. Obs., No. 20, 1953, pp 169-182

Attempt at Simultaneous Comparison of the Milky Way in Infrared and Photographic Rays

A comparison of spectral sections of the Milky Way radiations in 9750 and 1250 Å was processed. The low intensity of infrared radiation in the region of the anticenter and the strong infrared radiation of the galactic center were associated with the observed decreasing spectrokinetic temperature of the Milky Way clouds while approaching the galactic center.

SO: Referativnyi Zhurnal -- Astronomiya i Geodesiya, No. 3, 1953 (W-10907)

1. SHELOWARTY, Y. S.
2. USSR (600)
4. Radiation
7. Problem of cosmic radio-frequency radiation, Astron. zhur. 20, No. 1, 1953.

9. Monthly List of Russian Accessions, Library of Congress, May 1953. Unclassified.

45-10817, 12. (Prof.) (Dr. Phys-Math. Sci.)

B. T. R.
V. 3 No. 3
Mar. 1954
Geophysics

3490* Advances in Radio-Astronomy. (Russian.)¹ I. S. Shklovskii. *Nauka i Zhizn*, v. 20, no. 9, Sept. 1953, p. 14-16. Describes equipment and importance of this science. Relationship is claimed between cosmic rays and radio-astronomy. Photographs.

USSR/Astronomy - Radio Emission

Jan/Feb 53

"Problem of Cosmic Radio Emission," I.S. Shklovskij;
State Astron Inst imeni Shternberg

"Astron Zhur" Vol 30, No 1, pp 15-35

Critical review of foreign theories of stellar
radio emission (25 foreign references). Considers
radio emission as composed of two components: one
emitted by ionized interstellar gas, the other due
to radiative capture of electrons in interstellar
magnetic fields, as conceived by S.B. Pikelner
(DAN, 88, 2 (1953)). Received 3 Nov 52.

246T37

SHKLOVSKIY, I. S.

Sep/Oct 53

USSR/Astronomy - Galaxies, Radio Emission

"Photometric Paradox of Radio Emission of the Metagalaxy," I. S. Shklovskiy,
State Astron Inst im P. K. Shternberg

Astron Zhur, Vol 30, No 5, pp 495-507

Says that of the metagalactic component may be separated from sky glow only by radio-wave analysis. Attempts to prove homogeneous distribution of galaxies within the metagalaxy. The radius of sphere containing "radiogalaxies" is estimated at 200-250 megaparsecs. Photometric radius is analyzed from red-shift viewpoint. Recd 6 Mar 53.

Source #264T69

SHKLOVSKY, I.S.

USSR/Astronomy - Cosmic Rays, Nov/Dec 53
Radioastronomy

"Problem of the Origin of Cosmic Rays, and Radio-
astronomy," I.S. Shklovsky, State Astron Inst im
Shternberg

Astron Zhur, Vol 30, No 6, pp 577-592

Reviews problem of cosmic rays with respect to their
connection with radio stars. Analyzes energy
emitted at flaring of Supernovae as mostly converted
into cosmic rays, the origin of which he sees in
radiative capture of electrons in magnetic fields of
the Galaxy. Rec 23 May 53.

273T69

B.T.R. Vol. 3, No. 4

Apr. 54

Geophysics

REJOVNIY, I. I.

Identification of Infrared Radiation of the Night Sky by Vibrational-Rotational Bands of the OH Molecule. Trans. from the Russian.
Available at the Scientific Translations Center, Science, Division, Library of Congress, as number RT-4042.

RT-4042 - Russian Astronomical JISSN, 1951-463, 406, 1

TRICVARI, I. S.

Quantitative Analysis of the Intensity of OH Radiation of the Night Sky. Trans. from the Russian.
Available at the Scientific Translations Center, Science Division, Library of Congress, as number RT-4167.

Soviet Studies of the Gegenschein.
The Journal of the British Astronomical Association, 1953, v. 63, no. 6, p. 229.

SHKLOVSKIY, I. S.

USSR/Astronomy - Crab Nebula

21 Aug 53

"Nature of Glowing of Crab Nebula," I. S. Shklov-
skiy, State Astron Inst im Shternberg, Moscow State U

DAN SSSR, Vol 90, No 6, pp 983-986

The Crab nebula was extensively studied by W. Baade
and by R. Minkowski (cf. Ap. J. 96 (1942)). Author
studies its continuous and line spectra, originat-
ing from the core and the outer filament structure
respectively, and assumes the core to be responsible
for the emissive spectrum. Presented by Acad G. A.
Shayn 13 Apr 53.

269T50

SHKLOVSKIY, I. S.

21 Jul 53

USSR/Astronomy - Cosmic Rays, Origin

"Origin of Cosmic Rays," I. S. Shklovskiy, State Astron Inst in Shternberg

DAN SSSR, Vol 91, No 3, pp 475-478

Reviews (DAN SSSR, 29, 412, and 30, No 1 (1953)) and foreign articles (H. Alfvén, et al, Phys Rev, 79, 738, 1950) on cosmic rays. Mentions that, with P. P. Parenago, he detected the most powerful radio emission source, identical with supernova A. D. 369 in Cassiopeia, responsible for radiative capture of electrons. Presented by Acad G. A. Shajn 26 May 53.

262T35

SHKLOVSKIY, I. S.

USSR/Astronomy - Radio Emission,
Interstellar 1 Sep 53

"Possibility of the Observation of Monochromatic
Radio-Emission From Interstellar Molecules," I. S.
Shklovskiy, State Astron Inst im Shternberg

DAN SSSR, Vol 92, No 1, pp 25-28

Reviews briefly possibility of obtaining radio
spectrum lines from interstellar clouds other than
the dominant H line of 21 cm. Continues discussion
started by himself in Astron Zhur 26 (1949) and 29
(1952). Presented by Acad G. A. Shayn 1 Jul 53.

274T56

SHKLOVSKIY, I.S.

Identity of powerful discrete sources of radio radiation and supernovae which exploded in our galaxy during the past 2000 years. Astron. tsir. no. 143:1-4 N '53. (MLRA 7:8)

1. Gosudarstvennyy astronomicheskiy institut imeni Shternberga.
(Radio astronomy) (Stars, New)

SW 1/4, I.J.

and the following acceptance were, together with the essays and textbooks have been submitted for competition for the prizes for the following subjects: English, Mathematics, Science, History, Geography, Music, Art, and Physical Education.

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7. 1. 1952 12. 1952

WINDALE 02

Suklovskiy, I.S.

"The Solar Corona"
"Works on Radio Astronomy"

Moscow State University imeni K.V.
Lomonosov

AMBARTSUMYAN, V.A., akademik, redaktor; GINZBURG, V.L., redaktor; LEYKIN, G.A., kandidat fiziko-matematicheskikh nauk, redaktor; MASSEVICH, A.G., kandidat fiziko-matematicheskikh nauk, redaktor; TERLETSKIY, Ya.P., doktor fiziko-matematicheskikh nauk, redaktor; SHKLOVSKIY, I.S., doktor fiziko-matematicheskikh nauk, redaktor; FRADKIN, M.I., redaktor; ALEKSEYEVA, T.V., tekhnicheskii redaktor.

[Transactions of the Third Conference on Problems of Cosmogony, May 14-15, 1953. Origin of cosmic rays] Trudy...soveshchaniia...14-15 maia 1953 g.; proiskhozhdenie kosmicheskikh luchei. Moskva, Izd-vo Akademii nauk SSSR, 1954. 319 p. (MIRA 8:4)

1. Chlen-korrespondent AN SSSR (for Ginzburg).
(Cosmic rays)

SHKLOVSKIY, I.S.

Identifying discrete sources of radio emission as diffuse nebula
IC 1396 and filamentous nebula NGC 6357. Astron.zhmr. 31 no.6:
529-532 N-D '54. (MLRA 8:1)

1. Gosudarstvennyy astronomicheskiy institut imeni P.K.Shternberga.
(Radio astronomy) (Nebulae)

SHKLOVSKIY I.S.

Nature of radio emission of galactic clusters. Astron. zhur. 31
no.6:533-536 N-D '54. (MIRA 3:1)

1. Gosudarstvennyy astronomicheskiy institut imeni P.K.Shternberga.
(Radio astronomy)

SHKLOVSKIY, I. S.

523.164.42 : 523.841.11

1852. THE IDENTIFICATION OF THE MOST POWERFUL DISCRETE SOURCES OF RADIO-EMISSION OF THE GALAXY WITH THE REMAINS OF SUPERNOVA STARS, WHICH HAVE FLARED-UP IN THE LAST 2000 YEARS. I.S.Shklovskii

Dokl. Akad. Nauk SSSR, Vol. 94, No. 3, 417-20 (1954). In Russian.
Consideration of a fair number of radio-sources leads the writer to distinguish two types. The stars of the first type are relatively few in number and include all the powerful sources concentrated towards the galactic plane and identifiable with supernovae. The second type show no tendency to concentration towards the galactic plane and generally they appear to be of small power. The same classification was arrived at about the same time by Mills (Abstr. 8294/1952). The present paper goes on to examine the various chronicles of flares-up of supernovae and over the last 2000 years all such phenomena appear identifiable with presently radio-emitting nebulae. A useful table of these is given. It is suggested that two problems merit investigation: (a) to look optically for an emitting filamentary nebula, the remains of the supernova of 827 A.D., and (b) to search for discrete sources in the region of the well-known filamentary nebula in Cygnus, the remains of a supernova which occurred relatively close to the Sun about 10 000 years ago.

C.R.S. Manders

State Astronomical Inst. im P.K. Shternberg

SHKLOVSKIY, I. S.

USSR/ Astronomy

Card : 1/1

Authors : Shklovsky, I. S.

Title : The extended radiation source, near the ζ Geminorum is identified as a nebula, the latter being a remainder of the deflagration of Nova in 837.

Periodical : Dokl. AN SSSR, 97, Ed. 1, 53 - 55, July 1954

Abstract : In connection with a new powerful radiation source, detected near the ζ Twins, and identified recently (E. Baldwin & D. Dewhirst, Nature, 173, 164, (1954) as a remnant of the Supernova deflagrated in our Galaxy system in 837, reference is made to an earlier work published in USSR in 1951 by G. A. Shayn and V. F. Gaze. These Soviet scientists succeeded in obtaining a photograph of the nebula containing the above radiation source. Reference is made to Lundmark's catalogue of Novae stars and to the discrepancy between the coordinates of the radiation source of the nebula, as given by Lundmark, and those of Nova 837. This discrepancy is explained as a result of Lundmark's failure to properly interpret an old original Chinese source, in which the position of the star was indicated. 13 references; 7 of these USSR references (1951 - 1954)

Institution : The P. K. Shternberg State Astronomical Institute

Presented by : Academician, G. A. Shayn, April 1954

Shklovskiy, I. S.

USSR/ Astronomy - Cosmic radiation

Card 1/1 Pub. 22 - 8/48

Authors : Shklovskiy, I. S.

Title : Nature of discrete sources of cosmic radio-radiation

Periodical : Dok. AN SSSR 98/3, 353-356, Sep 21, 1954

Abstract : Various opinions and literature data, regarding the nature of discrete sources of cosmic radio-radiation, are presented. The mechanism of radio-radiation of discrete sources, understood as a retarded radiation of relativistic electrons in magnetic fields, is discussed. Data regarding the probable radiation sources of the Cygnus and Cassiopeja constellations are included. The probability that a certain amount of charged particles diffused in interstellar gas may transform into cosmic rays was debated. Thirteen references: 10-USSR; 2-USA and 1-German (1943-1953). Drawings.

Institution : The P. K. Shternberg State Astronomical Institute

Presented by : Academician G. A. Shayn, May 12, 1954

SHKLOVSKIY, I.S.

Equating discrete source of radio radiation 17-2A with diffuse nebula NGC 6523. Astron. tsir. no. 148:3-5 Ap '54. (MLRA 7:8)
(Radio astronomy)

SHKLOVSKIY, I. S.

"Visual Emission of the Crab Nebula in Continuous Spectrum" and "Some Problems of Metagalactic Radioemission," paper submitted at the International Astronomical Union Radio Astronomy Symposium, Jodrell Bank, UK, August 1955

A- 40421 - II

SHKLOVSKIY, Iosif Samuilovich; RAKHLIN, I.Ye., redaktor; GAVRILOV, S.S.
tekhnicheskii redaktor

[Radio astronomy] Radioastronomiia; populiarnyi ocherk Izd.2-os,
dop.Moskva, Gos.izd-vo tekhniko-teoret.lit-ry, 1955. 295 p.
(Radio astronomy) (MLRA 8:10)

SHKLOVSKIY, I. S.

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✓ Possible observation of monochromatic radioemission from interstellar molecules. I. S. Shklovskii (Sternberg Astron. Inst., Moscow). *Mém. soc. roy. sci. Lidge* 15, 676-7 (1955).—Permitted transitions between the components of A-doubling of the main rotational state of OH, CH, SiH, and other mols., should be observable in the radio spectrum of the galaxy as well as the 21-cm. line of H. The calcd. wave lengths and frequencies of these lines, which should have measurable intensities for an interstellar density of 3×10^{-4} mols./cc., are: OH, $\lambda = 18.3$ cm., $\nu = 1040$ Mc./sec.; CH, $\lambda = 9.45$ cm., $\nu = 3130$ Mc./sec.; SiH, $\lambda = 12.5$ cm., $\nu = 2395$ Mc./sec.

C. C. Kiess

W. C. K.

Shklovskiy, I. S.

USSR/ Astronomy - Cosmic radiation

Card 1/1 Pub. 8 - 4/13

Authors : Bakulin, P. I., and Shklovskiy, I. S.

Title : Occultation of two discrete sources of radiation by the moon

Periodical : Astron. zhur. 32/1, 29-32, Jan-Feb 1955

Abstract : A new method of studying the nature of discrete sources of cosmic radiation is suggested. This method consists in the analysis of observed data on the occultation of such sources by the moon. Data for two powerful discrete sources of cosmic radiation is presented and discussed. One of them is the taurus-A ($\alpha = 5^h 31^m 34.5^s$; $\delta = 22^\circ 01'$) the other is near the η Gemini with the coordinates $\alpha = 6^h 13^m 37^s$; $\delta = 22^\circ 38'$. Five references: 3 USSR and 2 USA (1951-1954). Tables.

Institution : The Shternberg State Astronomical Institute

Submitted : March 30, 1954

SHKLOVSKIY, I.S.; SHAYN, G.A.

Identification of some radio sources of large extent with optical objects. Astron.zhur. 32 no.2:118-123 Mr-Apr '55. (MLRA 8:5)

1. Gosudarstvennyy astronomicheskiy institut imeni P.K.Shternberga (for Shklovskiy). 2. Krymskaya astrofizicheskaya observatoriya Akademii nauk SSSR (for Shayn).
(Radio astronomy)

SHKLOVSKIY, I. S.

523.16
 3356
 The Nature of Radiation from Radiogalaxy NGC 4486.—I. S. Shklovski. (*Astronom. Zh.*, May/June 1955, Vol. 32, No. 3, pp. 215-225. English summary.) The continuous optical radiation from the 'jet' in the core of the galaxy is explained quantitatively by the presence of relativistic electrons with energies of 10^{11} - 10^{12} eV moving in a magnetic field of approximately 10^{-4} G; relativistic electrons with energies of 10^8 - 10^9 eV diffusing into the galaxy are probably the source of r.f. emission.

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State Astronomical Inst. in
 P.K. Shternberg.

rmf

PIKEL'NER, S.B.; GINZBURG, V.L.; SHKLOVSKIY, I.S.

Mechanism of particle acceleration in envelopes of novae and
supernovae. Astron. zhur. 32 no.6:505-513 N-D '55.
(Stars, Nov) (MIRA 9:2)

KAYDANOVSKIY, N.L.; KARDASHEV, N.S.; SHKLOVSKIY, I.S.

Observational data on discrete sources of cosmic radiowaves on 3.2
cm wavelength. Dokl.AN SSSR 104 no.4:517-519 0 '55. (MLRA 9:2)

1. Predstavleno akademikom G.A. Shaynom.
(Radioastronomy)

SHKLOVSKIY, I.S.

On lithium, beryllium, and deuterium content in the solar atmosphere. Dokl. AN SSSR 105 no.5: 931-934 D '55. (MLRA 9:3)

1. Gosudarstvennyy astronomicheskiy institut imeni Shternberga.
Predstavleno akademikom G.A. Shaynom.
(Spectrum, Solar)

It is suggested that Li and Be observed in solar atmosphere might be generated in the atmosphere itself by the "solar" cosmic rays produced during flares, when these rays collide with the O- and Fe-group nuclei. The flux of cosmic rays in solar atmosphere must be of considerable magnitude because the general magnetic field of the sun inhibits their exit into interstellar space. It is to be expected that the highly "active" stars have very high values of the cosmic-ray flux; this would explain the existence of the peculiar ("lithium" type) stars. The presence in solar atmosphere of large proportions of D has not been definitely proved; the author suggests looking for its lines in the flare spectra during solar eclipses.

Kosmicheskoye Radioizlucheniye (Cosmic Radio Emission), by ✓
I. S. Shklovskiy, Moscow, Gosudarstvennoye Izdatel'stvo
Tekhniko-Teoreticheskoy Literatury, 1956, 492 pp

"In the present monograph an attempt is made to present the total results of investigations in the field of cosmic radio emission for the [last] quarter century.... A basic problem of this monograph is the analysis of the ties between radio astronomy on the one hand and astrophysics, cosmology, and the problem of the origin of cosmic rays on the other hand."

54181.1374

SHKLOVSKIY, I. S.

"Theoretical Intensities of the Rotation-Vibrational Bands of Hydroxyl," a paper presented at the 7th International Astrophysical Colloquium, Liege, 12-14 Jul 1956.

SO: 568946

SHKLOVSKIY, I. S., GINZBERG, V. L. and PEKEL'NER, S. B.

"Radio Radiation of Discrete Sources," a report delivered at the Symposium on Radioastronomy held at the Jodell-Bank Experimental Radio-astronomical Station, Manchester University, Englan, is summarized in the account of this symposium in an article by V. V. VITKEVICH in Vest. Ak. Nauk SSSR for January 1956.

Sum. 900, 26 Apr 1956

SHKLOVSKIY, I. S.

Category : USSR/Radiophysics - Application of radiophysical methods

I-12

Abs Jour : Ref Zhur - Fizika, No 1, 1957, No 1995

Author : Shklovskiy, I.S.

Title : On the Nature of Discrete Sources of Radio Waves

Orig Pub : Tr. 5-go soveshchaniya po vopr. Rasmogonii. 1955, M., AN SSSR, 1956, 395-412,
diskus, 412

Abstract : See Ref. Zhur. Fiz., 1956, 23592

Card : 1/1

Category : USSR/Radiophysics - Application of radiophysical methods

I-12

Abs Jour : Ref Zhur - Fizika, No 1, 1957, No 2009

Author : Shklovskiy, I.S.

Title : Problems of Radio Waves from the Metagalaxy

Orig Pub : Tr. 5-go soveshchaniya po vopr. kosmogonii. 1955. M., AN SSSR, 1956, 554-561

Abstract : The observed cosmic radiation can be arbitrarily subdivided into uniformly distributed radiation and radiation from discrete sources. A great majority of the 2000 discovered sources of the "radio galaxy" are object outside the galaxy. Analysis of observation data has shown that the sources of the galactic radio waves form a spherical system, and only a small fraction of the intensity in the direction of the galactic poles is due to metagalactic sources. This confirms the observed distributions of radiation from the M31 nebula. In the region of the galactic poles, out of a brightness temperature $T_b = 600^\circ$, the share of the metagalactic radiation is $T_b^m = 150-200^\circ$. This brightness temperature T_b^m is due to the summary radiation from the "radio galaxies" and to radiation from the gathering of galaxies. The latter radiation cannot be considered as the joint radiation from the individual galaxies entering into the gathering; it is possible that this can be reduced to radiation from relativistic electrons in metagalactic magnetic fields. It is difficult to tell at this time what causes the observed brightness of the metagalaxy in the radio band, the radiation from the gathering of galaxies, or radiation from discrete sources of the NGC 5128 or of the NGC 1316 type. Bibliography, 11 titles.

SHKLOVSKIY, I.S.

Nature of planetary nebulae. Izv.Krym.astrofiz.obser. 16:
187-188 '56. (MIRA 13:4)

1. Gosudarstvennyy astronomicheskiy institut imeni P.K.
Shternberga.
(Nebulae)

SHKLOVSKIY, I.S.

New scale of distances to planetary nebulae. Astron.zhur. 33 no.2:
222-235 Mr-Apr '56. (MLRA 9:8)

1. Gosudarstvennyy astronomicheskiy institut imeni P.K. Shternberga.
(Nebulae) (Distances)

SHKLOVSKIY, I.S.

The nature of planetary nebulae and their nuclei. Astron.zhur.33 no.3:
315-329 My-Je '56. (MIRA 9:10)

1.Gosudarstvennyy astronomicheskiy institut imeni P.K.Shternberga.
(Nebulae)

⁵
SHKLOVEKIT, I., DR.

AS USSR

"Some Problems of the Radio-astronomical Theory of the Origin of Cosmic Radiation" (Section I) a paper submitted at the Cosmic Ray Conference (IAPAP) 21-26 Jun 57, Varese, Italy.

C-3,800,177

STERN, I. . and PRIGER, . . .

"The Nature of Galactic Halo," 91.
paper presented at Third Symposium on Cosmical Gas Dynamics, Cambridge, (Mass.),
24-26 June 1967.

Trans. Available
D-3,101,240, 1 Apr 56

SHKLOVSKIY, I. S.

"The State of Ionization of Interplanetary Gas and Its Significance for
Certain Geophysical Problems."

report presented at the Intl. Congress on Interplanetary Matter, Jena, GDR,
7-12 Oct 1957.

Geokhimiya, 1958, No. 1, p. 96. (author Krinov, Ye. L.)

PHASE I BOOK EXPLOITATION

Shklovskiy, Iosif Samuilovich, Doctor of Physical and Mathematical Sciences

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Novoye v radioastronomii (New Developments in Radio Astronomy) Moscow, Izd-vo "Znaniye", 1957. 23 p. (Vsesoyuznoye obshchestvo po rasprostraneniyu politicheskikh i nauchnykh znaniy. Seriya VIII, 1957, no. 44) 50,000 copies printed.

Ed.: Uspenskaya, N. V.; Tech. Ed.: Gubin, M. I.

PURPOSE: This transcript of a public lecture by the well-known Soviet astrophysicist Shklovskiy is published to provide a popular introduction to radio astronomy in general and to the recent developments and discoveries in this new branch of astronomy.

COVERAGE: The author gives a short review of the discovery of cosmic radio emission and its importance in the development of astronomy. He outlines the fundamentals of radio astronomy and the sources of cosmic radio emission. He describes the equipment now used in radio astronomy and devotes special attention to sources of radio emission outside the solar system. He describes the results of observations of the density of cosmic radio emission and presents two hypotheses concerning sources of emission and their distribution in the universe. After presenting a brief outline of the nature of cosmic rays, he shows the role of radio astronomy in solving the problem of their origin and their relation to cosmic radio emission. The

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New Developments in Radio Astronomy (Cont.)

lecture ends with a discussion of the problem of cosmogony. The author describes some of the findings of optical astronomy and shows the contributions of radio astronomy not only in the discovery of new objects, but also in formulating certain important conclusions concerning the structure of the metagalaxy. In the introduction, Soviet Academicians L. I. Mandel'shtam and N. D. Papaleksi are mentioned in connection with the radiolocation of the moon in 1946.

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AVAILABLE: Library of Congress

LK/bmd
June 3, 1958

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SHKLOVSKIY, I.S.

PHASE I BOOK EXPLOITATION

496

Akademiya nauk SSSR. Komitet po geodesii i geofizika

Mezhdunarodnaya assotsiatsiya geomagnetizma i aeronomii; tezisy dokladov na XI General'noy assambleye Mezhdunarodnogo geodezicheskogo i geofizicheskogo soyiza (The International Association of Geomagnetism and Aeronomy; Abstracts of the Reports at the XI General Assembly of the International Union of Geodesy and Geophysics) Moscow, Izd-vo AN SSSR, 1957. 46 p. 1,500 copies printed.

PURPOSE: This booklet is intended for dissemination of abstracts of papers presented by the Soviet members of the International Association of Geomagnetism and Aeronomy at the XI General Assembly of the International Union of Geodesy and Geophysics.

COVERAGE: This booklet with full English translation following the Russian text presents abstracts of papers, mainly on magnetics, telluric currents and aurorae, presented by Soviet contributors at the XI General Assembly of the International Union of Geodesy and Geophysics. It was published by the National Committee for Geodesy and Geophysics of the Academy of Sciences of the USSR.

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The International Association (Cont.)

TABLE OF CONTENTS:

Kelashnikov, A. G., Petrova, G. N., Grabovskiy, M. A. Results of an Investigation of Magnetic Properties of Rocks and Geological Bodies 5

Recent laboratory investigations showed that ferromagnetic rocks are uniformly magnetized. Remanent magnetism though distributed regularly, does not follow the direction of the magnetizing field. The article evaluates stability and temperature influence on thermomagnetization. In discussing the magnetic anisotropy the authors consider this property as typical for metamorphic rocks.

Krasovskiy, V. I. Investigations of Aurorae and Night Sky Glow in the USSR 11

The report contains latest data on radiation in the upper atmosphere. Hydroxyl radiation of night sky glow, twilight radiation of sodium and hydrogen emission in the maximum intensity zone of aurorae are discussed.

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The International Association (Cont.)

13

Krasovskiy, V. I. The Nature of Radiation in the Upper Atmosphere.

Radiation at 100 km from the surface of the earth is connected with the dissociation and formation of molecules. Variations of intensity of radiation are connected with temperature and pressure fluctuations in the upper atmosphere. Primary and secondary radiation of aurorae and their nature are discussed. Secondary radiation can originate as a result of recombination processes, formation of an electric field, and chemical reactions of primary ions and excited products.

15

Shklovskiy, I. S. Elementary Processes in the Upper Atmosphere as Evidenced by Radiation

In addition to common fluorescence originating in the selective absorption of ultraviolet solar radiation by atoms in the atmosphere with subsequent re-radiation of "softer" quanta, processes of resonance fluorescence take place in the upper atmosphere. With the detection of some lines in a twilight spectrum an estimate can be made of the number of Lyman quanta in short wave radiation from the sun.

Card 3/9

496

The International Association (Cont.)

Troitskaya, V. A. Short-Period Oscillations of the Earth's Electro-magnetic Field

18

Simultaneous studies of telluric currents and magnetic records facilitate the study of short-period oscillations. Experiments, installations for receiving telluric currents, and the basic principles of a proposed classification system for types of oscillations are discussed. The causal genetic relationship between various types of oscillations and the most favorable relative position of the Earth and the sun in exciting such oscillations were formulated.

21

Driatskiy, V. M. Ionosphere Near the Polar Region

Observations made from May 15, 1954 to April 14, 1955 on the drifting station SP-3 include vertical sounding of the atmosphere on a sliding frequency. During the period of minimum solar activity, the number of sun spots in the working period was 8.3. The vertical component of the Earth's magnetic field changed from 56,612 γ to 3,919 γ . The geomagnetic disturbance was much smaller than in polar observatories further south. The behavior of some ionospheric layers is nearly the same as in moderate latitudes and shows the same dependence on the elevation of the sun. Ionization of various layers is pronounced and triple magnetic-ionic splitting was observed rather frequently.

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25

The International Association (Cont.)

Kalinin, Yu. D. Forecasting Secular Geomagnetic Variations

Variation in annual values of geomagnetic elements is the summary effect of changes in the geomagnetic field caused by internal agents (δf) and by geomagnetic activity (δf_a). The latter could be completely eliminated by taking average values for 10-11 year cycles. The morphological examination of such factors leads to the establishment of space-time relationships. The effects of internal forces in Eurasia are of a smooth, quasi-periodic character lasting a few decades and the geomagnetic activity follows an eleven year cycle. This makes it possible to forecast average values for a five year period with sufficient accuracy and to construct magnetic charts for the nearest epoch.

Nikol'skiy, A. N. Distribution of Magnetic Disturbances in the Arctic Region Near the Pole

Irregular changes in the magnetic field are the main indication of disturbances in the high latitudes. The form and amplitude of the daily rate of disturbances are determined by the effect of the earth's permanent magnetic field on the incoming jets of solar particles. The diurnal variations in high latitudes are

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The International Association (Cont.)

very complex. Observations near the pole suggest the existence of a second zone of increased intensity and frequency of magnetic disturbances close to 80° geomagnetic latitude. This is well in accord with the studies of auroral and ionospheric disturbances and fits the theoretical findings of Alfvén.

33

Ben'kova, N. P. Electric Current in Magnetic Storms

The regular components of world magnetic and polar storms were studied in world-wide observations from 1932-1933. The potentials of these fields were computed and a system of polar storm currents was reconstructed. An increase in conductivity with depth was determined and a break in it established at 900-1200 km, where Gutenberg and Repetti discovered a discontinuity for P-waves.

36

Valler, A. Ye. Hydrogen Radiation in the Auroral Spectrum

An investigation of hydrogen radiation in the auroral spectrum was conducted at 64° of geomagnetic latitude and in the neighbouring regions. The data obtained concerns the bright beam flash and the afterglow phases. Prolonged exposure spectograms (1-2 hours) in the region of 6,400-6,600Å bear intense bands of the first positive system of N₂; there are no evident signs of H α on the photographs or microphotographs, yet in all seven spectra the presence of H α lines could be confirmed. Hydrogen radiation is regularly observed in the afterglow spectrum following a normally developing aurora.

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The International Association (Cont.)

38

Ivanov, M. M. Magnetic Surveys at Sea in the Non-Magnetic Ship "Zarya"

Lack of magnetic observations on the oceans after 1929 makes the study of variations of the earth's magnetic field and the secular changes largely conjectural. Older observations made by the ships "Galileo" and "Carnegie", based on a 100 mile grid, do not reflect regional magnetic anomalies related to the structure or relief of the sea bottom. A proposal has been made for another survey to be conducted by a laboratory ship. The specially built ship "Zarya" with a 600 t. displacement was supplied with everything necessary for a month's voyage. The personnel consisted of 34 persons of which 9 were research workers. The instruments used for measuring magnetic phenomena are: for measuring declination, a 127 mm optical goniometric compass and a range finding compass for continuous recording and measurement of differences between the gyro-course and the magnetic course for the horizontal component, two double magnetic compasses; for measuring H and Z, a two-component magnetodynamic magnetometer and a magnetodynamic T magnetometer with a self orientating indicator. "Zarya" already conducted some experimental work in the Baltic and the North Sea, discovering a considerable number of anomalies. In the future it will make some observations in several regions of the supposed maximum secular movement of magnetic elements.

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The International Association (Cont.)

Petukhov, V. A. Solar Neutron Emission as Sources of Magnetic Disturbances and Aurorae

43

The author discusses the neutron theory explaining the relationship between solar activity and processes occurring on earth, the possible physical processes leading to the formation of a large number of neutrons and the experimental findings in this field, and the determination of velocities of solar particles by time intervals between phenomena occurring on the sun and on earth.

Bukhnikkashvili, A. V. and Kebuladze, V. V. The Nature of Regional Telluric Currents and Their Relation to Geology

44

Telluric currents have interested scientists for a long time but the lack of systematic studies and the irregular distribution of stations prevents definite conclusions. Statistical examination of around-the-clock observations at the Dusheti station (Caucasus), led the authors to the opinion that the potential difference in a telluric field can be divided into the constant and the variable components. The latter depend on the sun's diurnal, seasonal, annual and secular variations as well as the time of occurrence of extremes of these variations. At the same time, the meteorological factors and the type

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of electrode grounding play an important part in the creation of a potential. The review analyzes telluric storms and disturbances, their rates, frequencies and amplitudes.

APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001549620017-6
The horizontal component of the magnetic and the latitudinal component of the telluric fields is fully established. Application of such currents to the study of geological structures in Georgia seems to be particularly successful in determining the depth of the crystalline basement.

AVAILABLE: Library of Congress

MM/bmd
9-2-58

Card 9/9

497

AUTHORS: Pikel'ner, S. B. and Shklovskiy, I. S.

TITLE: An investigation of the properties and energy dissipation of the galactic halo. (Issledovaniye svoystv i dissipatsiy energiy gazovoy korony galaktiki).

PERIODICAL: "Astronomicheskii Zhurnal" (Journal of Astronomy), 1957, Vol.34, No.2., pp. 145-158 (USSR)

ABSTRACT: The distribution of the sources of nonthermal radio-emission of the Galaxy is discussed. The division into a homogeneous sphere and an "Oort-Westerhout" sub-system is artificial. There is some concentration of emission towards the plane and centre of the Galaxy. The strength of the magnetic field in the upper ($H \approx 3 \cdot 10^{-6}$) and lower ($H \approx 6 \cdot 10^{-6}$) layers of the halo is estimated from the distribution of radio-emission and two hypotheses: 1) the concentration of cosmic rays is proportional to the field strength, 2) in the upper layers of the halo the magnetic pressure is about the same as the pressure of cosmic rays. The pressure of the magnetic field and cosmic rays at the height $z \sim 10$ kps is balanced by the weight of the upper layer. From this condition the density of the layer $n > 0.6 \cdot 10^{-2} \text{ cm}^{-3}$ is estimated. Evidently the gas pressure does not play an essential role in supporting the halo. To keep the cosmic rays the field of the halo must be irregular. Hence the

AUTHOR: Shklovskiy, I. S.
 TITLE: A possible new type of fluorescence of the Earth's atmosphere.
 (O vozmozhnom novom tipe fluorestsentsii zemnoy atmosfery).
 PERIODICAL: Astronomicheskii Zhurnal, 1957, Vol. 34, No.1, pp.127-130 (USSR)
 ABSTRACT:

As a result of cascade transitions during the resonance absorption of the solar emission line $I_{\beta 3}$ by the oxygen atoms of the Earth's atmosphere (transition $^3P_2 - ^3D$) infra-red lines $\lambda\lambda$ 11299 - 11287 and λ 8446 will be emitted. This should lead to a twilight flash of these lines. The expected intensity of the infra-red lines of oxygen during the twilight flash is calculated. For an undisturbed sun it is of the order of 10^8 photon/cm² sec. The line λ 8446 is in the region of the band (6.2) of the vibrational-rotational spectrum of hydroxyle of the Earth's atmosphere. This makes the observations of the twilight flash of the oxygen line difficult but not impossible. The author emphasizes that systematic observations of this flash give a new possibility of investigating the emission lines of the Lyman series in the solar spectrum as a function of solar activity. One figure. 6 references, none of which is Russian.

Physics of the Atmosphere Institute
 Ac.Sc., USSR.

Recd. July 20, 1956.

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An investigation of the properties and energy dissipation of the galactic halo. (Cont.)

field is connected with gas motions of the same energy. From the difference of H in the upper and lower⁻³ layers, the mean density of the gas $n \approx 0.01 \text{ cm}^{-3}$ is found. Spitzer's main objection to high velocity gas motions in the halo is the strong energy dissipation in supersonic motions. However, the velocity of sound increases in a magnetic field. If the magnetic energy is equal to the kinetic, then the velocity of motion is the same as that of sound. In this case, according to (13), the rate of dissipation decreases 20 - 30 times, and there is also a corresponding decrease in the temperature and ionization of the gas. The energy dissipation cannot be compensated by outbursts of Novae or Supernovae nor by the radiation of hot stars. It is shown that the motions in the halo can evidently be supported by the waves from the Galactic nucleus, where large gas motions are observed. The increase in nonthermal radioemission towards the centre of the Galaxy is caused by the same motions, which increase the field strength. Some examples of halos, with incomplete ionization and in rapid motion, are given. The Large

SHKLOVSKIY, I.S.

33-3-11/32

AUTHOR: Shklovskiy, I.S.

TITLE: -Once more on the distances to planetary nebulae and the evolution of their nuclei. (Yeshche raz o rasstoyaniyakh do planetarnykh tumannostey i ob evolyutsii ikh yader)

PERIODICAL: "Astronomicheskii Zhurnal" (Journal of Astronomy), 1957, Vol.34, No.3, pp. 403-410 (U.S.S.R.)

ABSTRACT: The objections raised by Vorontsov-Velyaminov (3) against the method of determination of distances to planetary nebulae, which was proposed by the present author in (1) and (2), are considered, as well as Vorontsov-Velyaminov's criticism of the present author's views on the origin and evolution of these nebulae.

It is shown that these objections are based on a misunderstanding and are inconsistent. For example, Vorontsov-Velyaminov's attempts to represent an expanding nebula as a shell with a constant linear thickness (which leads to a slower decrease in luminosity) are described as being unsupported by observations. The author suggests that this is also true of Vorontsov-Velyaminov's hypothesis of "sweeping-up" of interstellar gas by an expanding nebula, which was put forward by Vorontsov-Velyaminov in his attempt to slow down the rapid decrease of the optical thickness beyond the layman series limit.

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- determining the distances to

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Once more on the distances to planetary nebulae and the evolution of their nuclei. (Cont.)

planetary nebulae has not been used before.

There are 3 figures, 2 tables and 10 references, of which 6 are Slavic.

ASSOCIATION: State Astronomical Institute, imeni P.K. Shternberg.
(Gos. Astronomicheskii Institut im. P.K. Shternberga)

SUBMITTED: December 24, 1956.

AVAILABLE: Library of Congress

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SHKLOVSKIY I. S.
AUTHOR: Shklovskiy, I. S.

33-5-4/12

TITLE: On the Nature of the Emission from the Cancer Nebula.
(K Voprosu o Prirode Svecheniya Krabovidnoy Tumannosti.)

PERIODICAL: Astronomicheskiy Zhurnal, 1957, Vol. 34, No. 5,
pp. 706-715 (USSR).

ABSTRACT: In 1953 the author put forward a new interpretation of the optical emission of the Cancer nebula in the continuous spectrum. (Ref. 1) According to this interpretation the emission is due to radiation from very fast electrons (energy of the order of 10^{11} - 10^{12} eV) which move in a magnetic field. On the other hand radio emission is due to softer relativistic electrons having energies of about 10^8 - 10^{10} eV. On the basis of this theory it is possible to predict a completely new effect namely: polarisation of the optical emission. In 1954 Dombrovskiy was first to observe polarisation of light from the Cancer nebula (Ref. 3). The effect was investigated by a number of authors (Refs. 4 - 8). Although the theory was developed further (cf. Ref. 7 and 10) by a number of workers, a whole series of problems still remain unresolved. Some of these problems, such as the origin of cosmic rays, the nature of flares in supernovae etc. are considered in the present paper. It is shown that the contemporary

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33-5-4/12

On the Nature of the Emission from the Cancer Nebula.

hypothesis of the emission of relativistic particles from the supernova of 1054 meets with considerable difficulties. The formation of the well known "Wisp" which varies in brightness in the central part of the Cancer nebula as well as other variations of brightness in parts of the amorphous mass are explained by fluctuations of the magnetic field. A comparatively small increase in the total luminosity will cause a considerable increase in the magnetic field. Each relativistic electron during its "wanderings" in the magnetic fields of the Cancer nebula will meet different conditions. When it finds itself in a region where fluctuations of the magnetic field take place it loses energy by radiation. This loss is greater than that which takes place in the absence of fluctuations. In this way one can remove the difficulty connected with explaining the existence in contemporary Cancer nebula of very energetic radiating electrons which as a result of major losses of energy could not have been "conserved" during the last 900 years. According to the arguments put forward by the author a given relativistic electron need not radiate during all the 900 years and hence may retain sufficiently high energy. For example, electrons with energy greater

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33-5-4/12

On the Nature of the Emission from the Cancer Nebula.
relativistic electrons in the nebula which have an energy
greater than E_0 is given by

$$N(E > E_0) = \int_{E_0}^{\infty} N(E) dE = K \int_{E_0}^{\infty} \frac{dE}{E^{3.6}} = \frac{K}{2.6} \cdot E_0^{-2.6},$$

It follows that for energies greater than 10^7 eV $N = 8 \cdot 10^{-4} \text{ cm}^{-3}$, and for energies greater than $3 \cdot 10^6 \text{ eV}$ $N = 1.3 \cdot 10^{-3} \text{ cm}^{-3}$. It is suggested that the mean concentration of soft relativistic electrons in the regions where fluctuations of the magnetic field takes place may be of the order of 10^{-2} cm^{-3} . Although the origin of the magnetic field is not considered it is suggested that as the properties of the field of contemporary Cancer nebula become better known the problem of the origin of the field would be put on a more scientific basis. There are 1 figure, no tables, 13 references, 8 of which are Slavic.

SUBMITTED: April, 24, 1957.

ASSOCIATION: State Astronomical Institute imeni P.K. Shternberg.
Card 4/5 (Gos. Astronomicheskii in-t im. P. K. Shternberga)

20-2- 9/50

AUTHORS:

Krasovskiy, V. I., Shklovskiy, I. S.

TITLE:

The Possible Influence Exercised by the Explosion of Supernovae on the Development of Life on the Earth (Vozmozhnoye vliyaniye vspyshek sverkhnovykh na evolyutsiyu zhizni na zemle)

PERIODICAL:

Doklady AN SSSR, 1957, Vol. 116, Nr 2, pp. 197 - 199 (USSR)

ABSTRACT:

It is at present considered to be proved fact that radio-frequency radiation and also optical radiation (with continuous spectrum) of the crab-shaped nebulae is caused by relativistic electrons which move in magnetic fields. Therefore, these nebulae (the remainder of the supernovae explosion of 1054) probably contain an enormous quantity of relativistic particles, i.e. of primary cosmic rays. This is true also for all other nebulae that are remainders of supernovae explosions. Recently also a radio-frequency radiation of the fibrous nebulae in the Bear were observed, which are without doubt, remainders of supernovae explosions which took place several thousand years ago. In such nebulae the concentration of the primary cosmic particles is probably 30 to 100 times as great as near the earth. It is quite possible that the sun with its planets may enter such a domain with increased concentration of primary particles as

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The Possible Influence Exercised by the Explosion of Supernovae on the Development of Life on the Earth

a result of its motion within the galaxy. This happens whenever supernovae explode in the immediate neighborhood of the sun. The author is of the opinion that the number of supernovae explosions in our galaxy is abnormally large (within the last thousand years 1006, 1054, 1572, 1604 and 1843). Every 1000 years a supernovae probably explodes in a distance of at the most 1000 parsec, and every 200 million years in a distance of at the most 8 parsec. The hard radiation (e.g. X-ray radiation) which reached the earth as a result of these explosions and the nebulae resulting therefrom (in the first stage of development) was probably considerably greater than the hard radiation of the sun. There may have been epochs of many hundreds of years during which cosmic radiation was a hundred times stronger than it is today. This could have had serious biological and, above all, genetical consequences. In order to double the mutation frequency of the long-lived genera, the intensity of cosmic radiation need only to be doubled or trebled. Therefore, a thousand years' intensification of cosmic radiation by several dozens of its former amount must produce devastating consequences for relatively long-lived kinds. Also the great "dying-out" of reptiles at the end of the cretaceous period might be due

Card 2/3

KONONOVICH, Edvard Vladimirovich; SHKLOVSKIY, I.S., doktor fiz.-mat. nauk,
red.; RAKHLIN, I.Ye., red.; YERMAKOVA, Ye.A., tekhn. red.

[Solar corona] Solnechnaya korona. Pod red. I.S. Shklovskogo.
Moskva, Gos. izd-vo fiziko-matematicheskoi lit-ry, 1958. 86 p.
(Populiarnye lektsii po astronomii, no.9). (MIRA 11:10)
(Sun--Corona)

Shklovskiy, I S.

PLAZ I BOOK EXPLOITATION NOV/16/58

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Abademya nauk SSSR

Izvestiya spustnik zemli. Vyp. 1: Rezultaty nauchnykh issledovaniy, provedennykh po puti kosmicheskogo peresoga i voprosy iskusstvennykh spustnikov (Artificial Earth Satellites. No. 1: Results of Scientific Studies Carried Out in Accordance With the IGY Program by Means of the First and Second Artificial Earth Satellites) Moscow, Izd-vo AN SSSR, 1958. 95 p. 3,500 copies printed. [Microfilm and Zerox Copy]

Imp. Ed.: L.V. Kurnosova; Ed. of Publishing House: D.M. Alaksyeyev; Tech. Ed.: T.V. Polyakova.

PURPOSE: This collection of articles is the first in a series to be published regularly and is intended to disseminate to the scientific community data collected in investigations performed by means of artificial earth satellites.

COVERAGE: This collection includes papers covering scientific data obtained from the first and second Soviet artificial earth satellites. Among the areas reported on are measurements of cosmic radiation, atmospheric density, electron concentration in the ionosphere, and biological studies of an animal occupant of a satellite. Papers on the motions and perturbations of satellite orbits and optical and Doppler methods of satellite tracking are also included. Coverage of the individual articles is given in the Table of Contents.

Shklovskiy, I.S. Optical Methods for Observing Artificial Satellites. This paper presents a discussion of optical methods for satellite observation, the problems associated with them, and possible approaches for improving the effectiveness of these methods. The author treats the important problem of determining the space and angular coordinates systems at different moments of time by observations of artificial satellites from the earth's surface. Optical methods based primarily on the increased angular accuracy obtainable are compared with radio tracking methods. The need for such accurate observations in connection with geophysical problems and the requirements for the development of optical tracking systems are discussed. The author presents from accurate information on the properties of the upper atmosphere. The conditions for optical observation, such as the need for a dark background in conjunction with solar illumination

of the satellite (dark conditions), are pointed out. The importance of resolving power in the optical system and its influence on required brightness and accuracy of the recorded data are discussed. Practical problems associated with telescopic observations and their operation, such as the determination of the exact time that the satellite trace is interrupted by the shutter, are considered, as are several ways of using cameras. The author believes that the existing problems associated with optical tracking of satellites will be gradually overcome. There are 6 references, 1 of which are Soviet, 5 English, 1 German

SHKLOVSKIY, I. S.

"On the instability of gaseous haloes of galaxies,"
paper submitted for the Symposium on Radio Astronomy, 30 Jul-6 Aug 1958,
Paris.

*SHKLOVSKIY, I. S. and HINDBURG, V. L.

"Radioastronomy and the Origin of Cosmic Rays,"

paper submitted for the Symposium on Radio Astronomy, 30 July - 6 Aug 1953,
Paris.

*The Organizing Committee of the Symposium proposed Dr. I. S. Shklovskiy to
prepare an introductory report about the fundamental theoretical problems of
of radio astronomy

SEKLOVSKIY, I. S. and KRASOVSKIY, V. I.

"The Possible Influence of a Supernova Explosion on the Development of Life on Earth."

Physikalische Blatter, April 1958.

SHKLOVSKIY, I. S.

"On Hydrogen Emission in the Night Glow."

paper presented at International Astronomical Union (IAU) in Moscow, USSR, August 1958.

SHKLOVSKIY, I.S.; KONONOVICH, E.V.

Models of the solar chromosphere [with summary in English]. Astron.
zhur. 35 no.1:37-51 Ja-F '58. (MIRA 11:3)

1. Gosudarstvennyy astronomicheskiy institut im. P.K. Shternberga.
(Astronomical models)

SOV/33-35-4-5/25

3(1)

AUTHOR:

Shklovskiy, I.S.

TITLE:

The Interplanetary Medium and Some Problems of Physics of the Upper Atmosphere (Mezhplanetnaya sreda i nekotoryye voprosy fiziki verkhney atmosfery)

PERIODICAL:

Astronomicheskii zhurnal, 1958, Vol 35, Nr 4, pp 557-571 (USSR)

ABSTRACT:

The author studies the state of ionization of the interplanetary gas. The concentration of neutral hydrogen atoms is $\sim 0.5 \text{ cm}^{-3}$, that of ionized hydrogen atoms $\sim 200 \text{ cm}^{-3}$. The relative abundance of neutral atoms can in an essential degree be increased by neutralization processes of atoms on dust particles, caused by the contamination of the interplanetary plasma. The author discusses the relationship between the interplanetary gas and the planetary atmospheres. The renewal of the interplanetary gas by dissipation and accretion by sun particles takes place in the course of 10^3 - 10^4 years. The presence of neutral hydrogen atoms in corpuscular streams, not deflected by the magnetic field of the earth, may be the origin of aurorae and similar phenomena. In corpuscular streams in the interplanetary space excited hydrogen atoms can be

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Physics of the Upper Atmosphere

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formed and therefore $H\alpha$ emission is to be expected. The author also discusses the helium content of the interplanetary gas and its dissipation into the atmosphere of the earth, as well as the isotopic content of helium in the interplanetary medium and in the atmosphere. There are 26 references, 14 of which are Soviet, 9 American, 1 Irish, 1 German, and 1 English.

ASSOCIATION: Institut fiziki atmosfery AN SSSR (Institute for Atmospheric Physics AS USSR)

SUBMITTED: July 18, 1957 (initially)
and June 20, 1958 (after revision)

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SOV/33-35-6-3/18

3(1)

AUTHOR:

Shklovskiy, I.S.

TITLE:

On the Nature of the Fine Structure of Emission of Active Regions on the Sun

PERIODICAL:

Astronomicheskii zhurnal, 1958, Vol 35, Nr 6, pp 838 - 847 (USSR)

ABSTRACT:

The author starts from the papers of A.B. Severnyy [Ref 1,2] who observes since 1954 with the sun telescope of the Astrophysical Observatory at the Crimea the so-called "emission mustaches". The present paper has the purpose to explain some basic questions in connection with this phenomenon. The author gives a description of the excitation mechanism. The excitation takes places under the interaction of relatively small gas knots, which move in the active region with a velocity $\sim 10^8$ cm/sec, with the photospheric plasma. This interaction has the form of non-elastic collisions between hydrogen atoms, combined with shock wave phenomena which arise in front of the knots. The author gives several numerical data concerning these knots. The energy of the knots ($\sim 10^{28}$ ergs) is derived from the energy of the magnetic field in the active region. Finally, similar phenomena in the chromosphere and in

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On the Nature of the Fine Structure of
Emission of Active Regions on the Sun

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prominences are discussed.
There are 7 references, 5 of which are Soviet, and 2
English.

ASSOCIATION: Gosudarstvennyy astronomicheskiy institut imeni P.K.
Shternberga (State Astronomical Institute imeni P.K.
Shternberg)

SUBMITTED: May 13, 1958

Card 2/2

53-64-3-1/8

AUTHORS: Shklovskiy, I. S., Shcheglov, P. V.

TITLE: The Optical Observation of Artificial Earth-Satellites
(Opticheskiye nablyudeniya iskusstvennykh sputnikov Zemli)

PERIODICAL: Uspekhi Fizicheskikh Nauk, 1958, Vol. 64, Nr 3, pp. 417-427
(USSR)

ABSTRACT: The spatial coordinates of such satellites for various times are determined by means of radiotechnical and optical methods. This work is dealing with the optical methods, which enable to determine the coordinates of satellites more exactly, on principle, than do radiotechnical methods. The authors explicitly point out the importance of the exact position-finding of satellites. Above all, the analysis of the motion of satellites is important for the investigation of the shape of the earth. When the satellite is observed with an accuracy of 5", the coordinates of the observation place can be determined with an accuracy of several meters. An exact determination of the coordinates of satellites is first of all important for geodetic-and geophysical problems of geo-

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The Optical Observation of Artificial Earth-Satellites

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physics. This, however, ^{is} just one field of application for the exact coordinate determination. There is an interesting possibility for considerably increasing the brightness of satellites at dawn. It is the emergence of an "additional satellite" from the "main satellite". The additional satellite consists of a balloon of a thin aluminum-coated cover. At present such a balloon is realized which weighs 300 g, the apparatus for the gas filling included. But also bigger balloons of relatively light weight can be produced. Such a balloon has, however, because of its great braking effect, no substantial scientific value. The coordinates of the satellite can be determined by simultaneously photographing the satellite and the surrounding stars. The authors investigate the demands made on a system used for photographing satellites. Such a camera must take a fixed star of the 6th order within $1/300$ of a second. By means of the analysis of the photographic picture an accuracy of $\pm 1,5-2$ seconds of arc can be obtained. The use of photoplates is to be preferred in the photographic investigation. Until November 1957, no data of the use of such cameras

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The Optical Observation of Artificial Earth-Satellites

53-64-3-1/8

for the observation of the Soviet satellites were at hand. In the Soviet Union 66 stations for the visual observation of satellites were built. An apparatus was constructed on the basis of the standard air-camera NAFA -3c/25 in the Astronomical Institute imeni Shternberga (Gosudarstvennyy astronomicheskii institut im. Shternberga) for the observation of brighter satellites. After this another apparatus is described. The authors point out the possible use of electron-optical transformers, since they are much more sensitive than photo-plates, have, however, also disadvantages. The production of satellites of polyhedral shape would be an advantage, as the plane surfaces of this polyhedron act as plane mirrors. Finally the authors report on the observation of the satellites which became red-hot when entering the earth's atmosphere. There are 4 figures, 1 table, and 10 references, 2 of which are Soviet.

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1. Satellite vehicles--Motion 2. Satellite vehicles--Reflective effects 3. Satellite vehicles--Performance

AUTHORS: Getmantsev, G. G., Ginzburg, V. L., SOV/53-66-2-1/9
Shklovskiy, I. S.

TITLE: Radioastronomical Investigations With the Aid of Artificial
Earth Satellites (Radioastronomicheskiye issledovaniya s
pomoshch'yu iskusstvennykh sputnikov Zemli)

PERIODICAL: Uspekhi fizicheskikh nauk, 1958, Vol 66, Nr 2, pp 157-161
(USSR)

ABSTRACT: Artificial satellites are of great importance for optical-
as well as for radio-astronomy; they may serve as receiving
stations for near- and far ultraviolet-, X-ray- and far
infrared radiation which, because of absorption in the
atmosphere, does not reach the surface of the earth, as
well as for the r.f.-range where absorption in the tropo-
sphere and refraction and absorption in the ionosphere act
upon radiation. The authors first discuss absorption in the
troposphere (especially in the $\lambda < 2$ cm range), connection
with the effective temperature of the radiation source,
solar and lunar radiation, the influence exercised by the
ionosphere, and several problems of a general nature; dis-
cussion is based upon scientific publications mentioned

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SOV/53-66-2-1/9

Radiocastromical Investigations With the Aid of Artificial Earth Satellites

(Refs 1-8). The conditions for a receiving apparatus for the range $10 \text{ cm} < \lambda < 10 \text{ m}$ are then discussed ($T_{\text{eff}} = a\lambda^{2.8}$, intensity $I_{\nu} = \frac{2kT_{\text{eff}}}{2} \sim \lambda^{0.8}$; with $\lambda \sim 3 \text{ m}$, T_{eff} is of the order of 10^3 degrees, at $30 \text{ cm} < \lambda < 100 \text{ m}$ $T_{\text{eff}} \sim 10^6$ to 10^7 degrees; $I_{\nu} \approx \text{const}$; $\lambda > 100 \text{ m}$: $T_{\text{eff}} \approx 10^7$ degrees). The authors further discuss radio-receiving apparatus. For $\lambda > 100 \text{ m}$ very low limiting values of the noise factor ($F_n \sim 2$) are obtained for coincidence superheterodyne receiving sets. For large λ wire antennae of several 10 m length would be necessary; as this is impossible in a Sputnik, frame antennae with ferrite core are used, which can be of very small dimensions ($\ell \sim 10 \text{ cm}$, weight 300 g). The axis of the frame is parallel to the metal surface of the Sputnik. Because of a Sputnik's own rotary motion also the position of the frame is modified which causes fluctuations of the intensity of reception. It is therefore necessary to know the orientation of the frame at every instant. The antenna will not receive a radiation for which it holds that $\mathcal{E}(f, N) = 0$ at the place of reception. If the magnetic terrestrial field is

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Radioastronomical Investigations With the Aid of Artificial Earth Satellites SOV/53-66-2-1/9

neglected, it holds that

$$\varepsilon(f) = 1 - \frac{4\pi e^2 N}{m(2\pi f)^2} = 1 - 8 \cdot 10^7 \frac{N}{f^2}$$

Here N is the electron concentration, f - the frequency of the radiation received. In interplanetary space $N \sim 1$ to $5 \cdot 10^2$,

$\varepsilon(f) > 0$, $f > f_0 = 9 \cdot 10^4 - 2 \cdot 10^5$ or $\lambda = c/f < \lambda_0 = 1.5$ to 3 km. When measuring f_0 it is possible to calculate N according

to the aforementioned formula. The influence exercised by the terrestrial field complicates investigation, but this influence is not very considerable for relatively fast Sputniks. There are 11 references, 4 of which are Soviet.

Card 3/3

SHKLOVSKY, I. S.

ON THE NATURE OF HARD CORPUSCLES IN THE UPPER ATMOSPHERE
I.S. Shklovsky, V.I. Krasovsky, Yu.I. Galperin, Svetlitzky, Ye. M.

1. Investigations conducted by Soviet and American artificial earth satellites have led to the detection of a region of intensive corpuscular radiation commencing at an altitude of several hundreds of kilometres and consisting of two "belts".

2. An analysis of the spatial distribution of these belts permits drawing certain conclusions concerning the mechanisms of generation and "escape" of hard corpuscles.

3. An analysis is given of the relationship between aurorae and streams of solar corpuscles, on the one hand, and the energy spectrum and concentration of hard corpuscles in the outer "belt", on the other.

4. Calculations are made on the generation of hard corpuscles in the inner "belt" on the basis of the mechanism of decay of albedo neutrons.

5. There is given an analysis of other possibilities of generation of hard corpuscles in the upper atmosphere. Investigations of High-Energy Heavy Nuclei in the Primary Cosmic Radiation Close to the Geomagnetic Equator (Guam, Marianas Islands) D. M. Haskin, P. L. Jain, E. Lohrmann, Marcel Schein and M. Teucher.

In a large stack of nuclear emulsion exposed to the cosmic radiation at 102,000 feet near the geomagnetic equator, 540 tracks of high-energy heavy nuclei were located in a systematic scan and followed along the track.
Report presented at the International Cosmic Ray Conference, Moscow, 6-11 July 1959

SHKLOVSKIY, I.S.

"CERTAIN ASPECTS OF THE RADIOASTRONOMIC THEORY OF COSMIC RAY ORIGIN"

I.S. Shklovskiy,

1. An evaluation is made of the power of injectors supernovae of type II.
 2. The problem of radioactivity source associated with the Galaxy nucleus and the possible existence of singularities in the nuclei of some Galaxies (our Galaxy included) is discussed.
 3. A possible Galaxy corona feeding mechanism is suggested.
- report presented at the International Cosmic Ray Conference, Moscow, 6-11-July 1959

SHKLOVSKY, I. S.

FIGURE 1. BOOK EVALUATION 50V/5065

29(0)

Izvestiya Sputnika, No. 3 (Artificial Earth Satellites, No. 3)
Moscow, Izd-vo Akademii Nauk SSSR, 1959. 125 p. 5,500 copies printed.

Sponsoring Agency: Akademiya Nauk SSSR.

Responsible Editor: L.Y. Kuznetsov; Ed. of Publishing House: L.Y. Semanenko; Tech.
Ed.: Yu. Rylov.

PURPOSE: This collection of articles is the third in a series intended to
discuss the use of artificial earth satellite investigations
to scientists.

SCOPE: The collection of articles deals with various problems arising in
the operation of artificial satellites. The papers also cover the use of
artificial satellites as scientific instruments for various types of geo-
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Atmosphere at an Altitude of 450 km by the Method of Sodium-vapor Diffusion

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AVAILABLE: Library of Congress
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SHKLOVSKIY, I. S.

PHASE I BOOK EXPLOITATION

SOV/4890

Pravda

Besprimernyy nauchnyy podvig; materialy gazety "Pravda" o trekh sovetskikh kosmicheskikh raketakh (Unparalleled Scientific Achievement: Materials From "Pravda" on 3 Soviet Cosmic Rockets) Moscow, Gos. izd-vo fiziko-matematicheskoy lit-ry, 1959. 202 p. 50,000 copies printed.

PURPOSE: This book is intended for the general reader.

COVERAGE: The book contains articles from "Pravda", announcing the launching of three Soviet cosmic rockets on 2 January, 12 September, and 4 October 1959. Articles which describe details and observations of the flights of the rockets are included and are illustrated by diagrams and photographs. The book contains nontechnical contributions by several Soviet scientists. No personalities are mentioned. There are no references.

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To the Scientists, Engineers, Technicians, Workmen, and the Entire Group of Workers Participating in the Creating and Launching of the Cosmic Rocket

The Soviet Cosmic Rocket

Shklovskiy, I. S. [Doctor of Physics and Mathematics]. Artificial Comet

Vernov, S., [Corresponding Member, AS USSR], and A. Chudakov [Doctor of Physics and Mathematics]. The Newest in the Study of Cosmic Rays

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AVAILABLE: Library of Congress (TL796.5.R8P66)

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AC/dfk/fal
3-20-61

34127
S/124/62/000/001/032/046
D237/D304

3,5110
AUTHORS:

Shklovskiy, I. S., and Kurt, V. G.

TITLE:

Determining atmospheric density at an altitude of 430 km by the method of diffusion of sodium vapors

PERIODICAL:

Referativnyy zhurnal, Mekhanika, no. 1, 1962, 96, abstract 1B660 (V sb. Iskusstv. sputniki Zemli. no. 3. M., AN SSSR, 1959, 66-76)

TEXT: A method of determining atmospheric density by diffusion of sodium vapors is considered, and the authors assume that it can be used at altitudes of 200 - 600 km. On September 19, 1958, in the USSR, the first experiment was performed on a high altitude rocket, on density determination by the above method at an altitude of 430 km. The article describes the experiment, instrumentation, and observations of the sodium cloud after its formation. The relation is shown between the brightness of the

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Determining atmospheric...

center of the cloud and time by photographic and photo-electric recording and the dependence of total radiation on time. In the first few tens of seconds after the evaporation, the cloud was irregular and changing, but after approximately 100 sec., it became spherical; and also from that moment, total radiation flow, after a period of sharp rise, became constant. The radius of the cloud S varied with respect to time, according to the law $S = t^{1/2}$, which is characteristic for a diffusion process in the cloud. As an example, estimation of the density of air at an altitude of 430 km by the diffusion of clouds gives $n = 1.6 \times 10^8 \text{ cm}^{-3}$ (or by more exact calculations, $n = 2.5 \times 10^8 \text{ cm}^{-3}$). In this determination of the air density by the diffusion of sodium vapor cloud method, a series of assumptions is made: temperature of the atmosphere is 1600°K; density of atmosphere within the limits of the cloud is constant (diameter of the cloud--100 km); force of gravity is neglected; size of atoms is taken as

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Determining atmospheric...

$a = 3.5 \times 10^{-8}$ cm, etc. The authors estimate the probable error in determining n as 30%. Therefore, $n = (2.5 \pm 0.75) \times 10^8 \text{ cm}^{-3}$. If it is assumed that the atmospheric composition is mainly atomic nitrogen and oxygen, then $\rho = (6.7 \pm 2) \times 10^{-15} \text{ g/cm}^3$. From the analysis of retardation of the satellite 1958^c (Explorer 1) at a height of 450 km, $\rho = (9 \pm 6) \times 10^{-15} \text{ g/cm}^3$, while, according to the data, at that height $\rho = 3 \times 10^{-15} \text{ g/cm}^3$. Some results are given of density determination by satellite retardation, and their good agreement is noted with the results obtained by the authors. 16 references. [Abstracter's note: Complete translation.]

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SOV/49-59-8-7/27
AUTHORS: Krasovskiy, V. I., Shklovskiy, I. S., Gal'perin, Yu. I.
and Svetlitskiy, Ye. M.

TITLE: Detection of Electrons in the Upper Atmosphere¹² with
Energies of About 10 keV on the Third Satellite¹¹

PERIODICAL: Izvestiya Akademii nauk SSSR, Seriya geofizicheskaya,
1959, Nr 8, pp 1157-1163 (USSR)

ABSTRACT: An account is given of the results of measurements of
electron streams with energies of 10 to 40 keV. The
measurements were carried out by means of two fluorescent
screens covered with thin pieces of absorbing aluminium
foil placed on the satellite. Their radiation was recorded
by photoelectron multiplier. It was found that the stream
intensity decreased sharply with a decrease of energy.
The stream of energy at high latitudes during the night
was observed several tens of $\text{ergs/cm}^2 \cdot \text{sec} \cdot \text{str}$. Fig 1
gives an examples of the relationship of the intensity of
a stream of electrons and its equivalent energy a
measured on May 15, 1958 at -42 to -54° magnetic latitude
Card 1/2 in the region 1720-1880 km high over the South Pacific. ✓

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Detection of Electrons in the Upper Atmosphere with Energies of
About 10 keV on the Third Satellite

The concentric circles represent repeated values.
There are 1 figure and 26 references, 9 of which are
Soviet and 17 English.

ASSOCIATION: Akademiya nauk SSSR Institut fiziki atmosfery
(Institute of Physics of the Atmosphere, Ac.Sc., USSR)

SUBMITTED: April 3, 1959 ✓

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65235

S/049/59/000/12/009/027
E032/E591

3.9000

AUTHOR:

Shklovskiy, I.S., Krasovskiy, V.I. and Yu.I. Gal'perin

TITLE:

On the Nature of Corpuscular Radiation in the Upper Atmosphere

PERIODICAL: Izvestiya Akademii nauk SSSR, Seriya geofizicheskaya, 1959, Nr 12, pp 1799-1806

ABSTRACT: Soviet and American investigations carried out with the aid of artificial Earth satellites have led to the discovery of an intense belt of corpuscular radiation which begins at an altitude of 400-600 km (Refs 1-4). Recent results obtained with the aid of cosmic rockets have given the spatial distribution of the intensity of the hard corpuscular radiation surrounding the Earth (Refs 5 and 6). It transpired that there are two belts of corpuscular radiation. The first belt (the inner belt) forms an equatorial ring bounded (approximately) by the geomagnetic latitudes $\pm 40^\circ$. According to Ref 6, the width of this belt is somewhat smaller. The belt has a concentration maximum at an altitude of about 3000 km (above the geomagnetic equator). The second (outer) belt extends up to 6-8 terrestrial radii and its concentration maximum is at a distance of

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On the Nature of Corpuscular Radiation in the Upper Atmosphere

3.5-4 terrestrial radii. In order to explain the origin of the belt of fast charged particles surrounding the Earth, a number of authors have put forward the neutron decay hypothesis (Refs 7-9). This is the so-called trapped albedo theory of the radiation belt. However, an analysis of the spatial distribution of the particles in the two belts excludes, in the opinion of the present authors, the albedo theory. In fact, the presence of an equatorial belt means that the particles forming this belt "avoid" moderate and high geomagnetic latitudes. Apparently this is a result of the fact that geomagnetic disturbances and polar auroras at higher latitudes remove particles from the inner belt and prevent their accumulation. This means that the equatorial belt is supplied with particles only from below, i.e. from the lower layers of the terrestrial atmosphere. On the other hand, the spatial distribution of particles in the outer belt clearly indicates an extra-terrestrial source. Again, the particles in the outer belt, once they appear in the magnetic trap at the distance of 3.5-4 terrestrial

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On the Nature of Corpuscular Radiation in the Upper Atmosphere

radii, will accumulate in this region over a longer interval of time than at the distance of 5-6 terrestrial radii since the frequency and amplitude of geomagnetic disturbances at latitudes of 50-60° are greater by a factor of several tens than in the zone of maximum repeatability of polar auroras. This explains the observed position of the maximum in the outer belt. The difference in the origin of the particles in the two belts leads also to a difference in their energies. Thus, an analysis of the spatial distribution of the particles in the two radiation belts leads to the conclusion that the main reason for the escape of particles in the outer (and apparently also in the inner) zone are geomagnetic disturbances and the associated auroras. Of course in the case of the inner belt the relevant auroras are the low-latitude auroras which are relatively rare. During geomagnetic disturbances, the normal field at high altitudes is disturbed and the particles confined in the trap can escape both into the inter-planetary space and

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E52/E591
 Emission of Coronal Radiation in the Outer Atmosphere
 dense layers of the corona

... of Coronal Radiation in the Outer
... into the more dense layers of the atmosphere
... thus causing solar auroras. The auroras
... the trace in the lower atmosphere

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On the Nature of Corpuscular Radiation in the Upper Atmosphere

charged particles as a result of the interaction of cosmic rays with the atmosphere, leading to the formation of neutrons (other than those formed in stars). Meson decays are also a source of unstable neutral particles. Another more powerful source are nuclear explosions. There are thus two sources for the inner belt, the first of which is the trapped cosmic ray albedo which can supply approximately 2×10^{22} - 2×10^{23} electrons with energy up to 780 keV and 10^{20} - 10^{21} protons with energy up to 30 MeV during a time interval of 10^6 - 10^7 sec. The second source is the nuclear explosion source, which at times can considerably increase the intensity of the hard corpuscular radiation in the equatorial belt. It is pointed out that it would be very desirable to have further data on the identification and the energy spectrum in the equatorial belt. There are 1 table and 25 references, 11 of which are Soviet, 11 English and 1 French.

ASSOCIATION: Akademiya nauk SSSR Institut fiziki Atmosfery
Card6/6 (Ac.Sc., USSR, Institute of Physics of the Atmosphere)
SUBMITTED: April 22, 1959

3(1)

AUTHORS: Pikel'ner, S.B., Shklovskiy, I.S.
Ivanov-Kholodnyy, G. S.

SOV/33-36-2-8/27

TITLE: On Possible Mechanisms of Emission of Discrete Galactic Objects in the Spectral Region 1225 - 1350 Å

PERIODICAL: Astronomicheskii zhurnal, 1959, Vol 36, Nr 2, pp 264-268 (USSR)

ABSTRACT: The authors examine the possibility of explaining the emission of discrete galactic sources, observed in the spectral region 1225 - 1350 Å, by usual mechanics. However, this explanation requires the assumption that the absolute value of brightness of galactic sources in this spectral region were considerably overestimated. The measurements of the H α line necessary for the investigation were carried out by N.N. Shefov and V.S. Prokudina in the Zvenigorod station of the Institute for Atmospheric Physics of the Academy of Sciences USSR. There are 9 references, 3 of which are Soviet, 3 American, and 3 English.

SUBMITTED: October 27, 1958

Card 1/1

3 (7), 29 (2), 29 (5)
AUTHORS: Krasovskiy, V. I., Shklovskiy, I. S., SOV/20-127-1-20/65
Gal'perin, Yu. I., Svetlitskiy, Ye. M.

TITLE: The Discovery in the Upper Atmosphere by Means of the Third
Sputnik of Electrons Having an Energy of About 10 kev
(Obnaruzheniye v verkhney atmosfere s pomoshch'yu tret'yego
sputnika elektronov s energiyey okolo 10 kev)

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 127, Nr 1, pp 78 - 81
(USSR)

ABSTRACT: In the third Soviet sputnik (which was launched on May 15, 1958)
an experiment concerning the direct discovery of electrons of
not very high energy was carried out in the upper atmosphere
(Refs 1,2,3). It is characteristic of this experiment that
practically only electrons of some dozens of kev were recorded.
The indicators used did not react to the X-ray radiation gene-
rated by these electrons in the atmosphere and in the shell of
the sputnik. Therefore, thin fluorescence screens (ZnS, acti-
vated Ag) with 2 mg matter per 1 cm² were used. As the authors
used aluminum foils of various thicknesses as absorbers, it was
possible, besides the intensity of fluxes of electrons of not
particularly high energies, to evaluate also the "equivalent"

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The Discovery in the Upper Atmosphere by Means of the Third Sputnik of Electrons Having an Energy of About 10 kev

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energy of the electrons. The limiting diaphragms fitted before the indicators warranted the recording of corpuscles within a solid angle of $1/4$ steradian. The radiotelemetric material determined furnished several results of great geophysical interest: Electrons of ~ 10 kev were detected in altitudes of from 470 to 1880 km above sea level. The lowest intensity was found over the geomagnetic equator in an altitude of ~ 1300 km above sea level. At the "equivalent" energy of ~ 20 kev its minimum amperage was estimated at 10^{-14} a. cm^{-2} steradian $^{-1}$. In medium and polar latitudes (up to 60° geomagnetic latitude) an amperage of $5 \cdot 10^{-11}$ a. cm^{-2} steradian $^{-1}$ and sometimes also of more than 10^{-10} a. cm^{-2} steradian $^{-1}$ is usual for electrons with an equivalent energy of 12 kev by night. With the construction of the measuring apparatus, such high intensities were not expected. Therefore, the intensities exceeded the apparatus scale, and the intensity and "equivalent" energy of the electrons recorded could not be evaluated. A diagram shows the dependence

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